

AMENDMENTS TO THE CLAIMS

The claims in this listing will replace all prior versions, and listings, of claims in the application.

1. (Currently Amended) A multi-air conditioner comprising:

an outdoor unit installed at an outdoor location, and having ~~therein~~ a compressor, an outdoor heat exchanger, and an outdoor fan for ventilating the outdoor heat exchanger;

a plurality of indoor units installed at respective indoor ~~rooms~~ areas, each indoor unit having ~~therein~~ an electronic expansion valve and an indoor heat exchanger;

a distributor provided between the outdoor unit and the plurality of indoor units, for selectively guiding a refrigerant ~~introduced~~ from the outdoor unit to the plurality of indoor units according to an operation condition;

a four-way valve provided on an outlet side of the compressor, for selectively switching a flow direction of the refrigerant flowing through the outdoor heat exchanger;

a selective expansion unit provided at a ~~rear~~ side of the outdoor heat exchanger, for selectively expanding the refrigerant according to ~~the~~ a flow direction of the refrigerant;

a gas-liquid separator provided in the outdoor unit, for separating a vapor-phase refrigerant and a liquid-phase refrigerant from the refrigerant flowing out of the outdoor heat exchanger; and

a connection tube part having a first connection tube for connecting the four-way valve with ~~[[a]]~~ the distributor, a second connection tube for connecting an upper portion of the gas-liquid separator with the distributor to guide the vapor-phase refrigerant, and

a third connection tube for connecting a lower portion of the gas-liquid separator with the distributor to guide the liquid-phase refrigerant.

2. (Currently Amended) The multi-air conditioner of claim 1, wherein the four-way valve selectively switches between a first connection state in which the outlet side of the compressor is connected with the outdoor heat exchanger and an inlet side of the compressor is connected with the ~~separator~~ distributor, and a second connection state in which the outlet side of the compressor is connected with the distributor and the inlet side of the compressor is connected with the outdoor heat exchanger.

3. (Currently Amended) The multi-air conditioner of claim 1, wherein the selective expansion unit comprises:

[[a]] parallel ~~tube connected~~ tubes extending between the outdoor heat exchanger and the gas-liquid separator;

a first check valve provided ~~on one side~~ along one of the parallel ~~tube~~ tubes, for passing the refrigerant flowing from the outdoor heat exchanger toward the gas-liquid separator; and

a heating electronic expansion valve provided on the other side of the parallel ~~tube~~ tubes, for expanding the refrigerant introduced into the outdoor heat exchanger.

4. (Currently Amended) The multi-air conditioner of claim 1, further comprising a bypass unit for guiding the refrigerant introduced through the second connection tube to the inlet of the compressor, ~~in case~~ when a majority of indoor units operate in ~~the~~ a heating mode while the ~~rest operates in the~~ remaining indoor units operate in a cooling mode.

5. (Currently Amended) The multi-air conditioner of claim 4, wherein the bypass unit comprises:

a bypass tube for connecting the ~~vapor-phase~~ first connection tube with a tube connecting ~~between~~ the four-way tube valve and the outdoor heat exchanger;

a first valve provided on the bypass tube, and opened only when the majority of indoor units ~~operates~~ operate in the cooling mode while the ~~rest operates~~ remaining indoor units operate in the heating mode; and

a second check valve provided on the second connection tube and positioned between the gas-liquid separator and the bypass tube, for passing only the refrigerant flowing from the gas-liquid separator toward the ~~separator~~ distributor.

6. (Currently Amended) The multi-air conditioner of claim 5, wherein the distributor comprises:

a guide tube ~~part~~ for selectively guiding the refrigerant ~~introduced~~ from the outdoor unit to the respective indoor units, and guiding the refrigerant heat-exchanged in the respective indoor units to the outdoor unit; and

a valve ~~part~~ for controlling a flow of the refrigerant in the guide tube ~~part~~ such that the refrigerant is selectively introduced into the respective indoor unit according to the operation condition.

7. (Currently Amended) The multi-air conditioner of claim 6, wherein the guide tube ~~part~~ comprises:

vapor-phase branch tubes branched from the second connection tube and connected to the indoor units, respectively;

liquid-phase branch tube branched from the third connection tube and connected to the indoor units, respectively; and

connection branch tubes connecting the first connection tube and the indoor units, respectively.

8. (Currently Amended) The multi-air conditioner of claim 7, wherein the valve part comprises a two-way valve provided in each of the vapor-phase branch tubes, each of the liquid-phase branch tubes, and each of the connection branch tubes, and turned on or off according to the operation condition.

9. (Currently Amended) The multi-air conditioner of claim 8, wherein ~~each~~ the electronic expansion valve ~~provided in~~ of each of the indoor units is provided in each of the liquid-phase branch tubes connecting the indoor heat exchangers and the distributor.

10. (Previously Presented) The multi-air conditioner of claim 1, further comprising a controller that controls revolution times of the outdoor fan such that a mixed ratio of a vapor-phase refrigerant and a liquid-phase refrigerant introduced to the gas-liquid separator via the outdoor heat exchanger is controlled according to the operation condition.

11. (Currently Amended) The multi-air conditioner of claim 10, wherein the controller comprises:

a temperature sensor provided between the outdoor heat exchanger and the gas-liquid separator, for sensing a temperature of the refrigerant; and

a microcomputer for comparing the sensed temperature of the refrigerant with a predetermined temperature to calculate the mixed ratio of the refrigerant, and for

controlling the revolution times of the outdoor fan to equalize the calculated mixed ratio with the a predetermined mixed ratio according to the operation condition, ~~in case~~ when the indoor units all operate in the cooling mode, or ~~in case~~ when a majority of indoor units operate in the cooling mode while the ~~rest operates~~ remaining indoor units operate in the heating mode.

12. (Currently Amended) The multi-air conditioner of claim 9, wherein, when ~~in case~~ the indoor units all operate in the cooling mode or ~~in case~~ when the majority of indoor units operate in the cooling mode while the ~~rest operates~~ remaining indoor units operate in the heating mode, the four-way valve is switched to connect the an outlet of the compressor with the outdoor heat exchanger and to connect the an inlet of the compressor with the distributor.

13. (Currently Amended) The multi-air conditioner of claim 12, wherein, when ~~in case~~ the indoor units all operate in the cooling mode, the heating electronic expansion valve and the first valve are closed, the electronic expansion valves of the indoor units all operate, the two-way valves connected to the vapor-phase branch tubes are all closed, and the two-way valves connected to the connection branch tubes and the liquid-phase branch tubes are all opened.

14. (Currently Amended) The multi-air conditioner of claim 12, wherein, when ~~in case~~ the majority of indoor units operate in the cooling mode while the ~~rest operates~~ remaining indoor units operate in the heating mode, the heating electronic expansion ~~valves~~ valve and the first valve are closed,

~~in case of~~ for the indoor units ~~operating~~ that operate in the cooling mode, the electronic expansion ~~valves~~ valve connected to the indoor heat exchangers operate, the

two-way valves connected to the vapor-phase branch tubes are closed, and the two-way valves connected to the connection branch tubes and to the liquid-phase branch tubes are opened, and

~~in case of~~ for the indoor units ~~operating~~ that operate in the heating mode, the electronic expansion valves connected to the indoor heat exchangers are opened, and the two-way valves connected to the vapor-phase branch tubes, to the liquid-phase branch tubes and to the connection branch tubes are opened.

15. (Currently Amended) The multi-air conditioner of claim 9, wherein, when ~~in case~~ the indoor units all operate in the heating mode, or ~~in case~~ when the majority of indoor units operate in the heating mode while the ~~rest operates~~ remaining indoor units operate in the cooling mode, the four-way ~~valves are~~ valve is switched to connect the outlet of the compressor with the distributor and to connect the inlet of the compressor with the outdoor heat exchanger.

16. (Currently Amended) The multi-air conditioner of claim 15, wherein, when ~~in case~~ the indoor units all operate in the heating mode, the heating electronic expansion ~~valves operate~~ valve operates, the first valve is closed, the electronic expansion valves of the indoor units are all opened, the two-way valves connected to the vapor-phase branch tubes are all closed, and the two-way valves connected to the connection branch tubes and to the liquid-phase branch tubes are all opened.

17. (Currently Amended) The multi-air conditioner of claim 15, wherein, when ~~in case~~ the majority of indoor units operate in the heating mode while the ~~rest operates~~ remaining indoor units operate in the cooling mode, the heating electronic expansion valve operates and the first valve is closed, ~~in case of~~ for the indoor units ~~operating~~ that

operate in the heating mode, the electronic expansion valves connected to the indoor heat exchangers are opened, the two-way valves connected to the vapor-phase branch tubes are closed, and the two-way valves connected to the connection branch tubes and to the liquid-phase branch tubes are opened, and

~~in case of~~ for the indoor units ~~operating~~ that operate in the cooling mode, the electronic expansion valves connected to the indoor heat exchangers operate, the two-way valves connected to the vapor-phase branch tube and to the liquid-phase branch tube are closed, and the two-way valves connected to the connection branch tube are opened.

18. (Original) The multi-air conditioner of claim 1, wherein the gas-liquid separator is provided between the selective expansion unit and the distributor.

19. (Currently Amended) An operation method of a multi-air conditioner, the method comprising:

when indoor units all operate in a cooling mode, or when ~~in case~~ a majority of indoor units operate in the cooling mode while the ~~rest operates~~ remaining indoor units operate in a heating mode, switching a four-way valve such that a refrigerant discharged from a compressor is introduced into an outdoor heat exchanger; and

closing a heating electronic expansion valve, and

when the indoor units all operate in the heating mode, or when ~~in case~~ the majority of indoor units operate in the heating mode while the ~~rest operates~~ remaining indoor units operate in the cooling mode, switching the four-way valve such that a vapor-phase refrigerant discharged from the compressor is introduced into a ~~first~~ connection tube; and

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operating the heating electronic expansion valve.

20. (Currently Amended) An operation method of a multi-air conditioner, the method comprising:

when indoor units all operate in a cooling mode, or when ~~in case~~ a majority of indoor units operate in the cooling mode while the ~~rest operates~~ remaining indoor units operate in a heating mode,

sensing a temperature of a refrigerant flowing between an outdoor heat exchanger and a gas-liquid separator using a temperature sensor; and

comparing the sensed temperature of the refrigerant with a predetermined temperature to detect a mixed ratio of the refrigerant in a tube; and

varying revolution times of an outdoor fan to equalize the detected mixed ratio with a predetermined mixed ratio.